

**REMARKS**

Review and reconsideration on the merits are requested.

Claims 1 and 2 were rejected under 35 U.S.C. § 102(b) as being anticipated by EP 1 103 807 A2 to Nadami et al. (EP '807). EP '807 was cited as meeting each of the terms of the rejected claims, including application of voltage to each electrode as disclosed in paragraph [0028] and shielding one of the electrodes from the gas atmosphere as required by present claim 2.

In response, claims 1 and 2 have been amended to require AC voltage application means for applying an AC voltage between the first and second electrodes so as to measure an impedance therebetween, which structural element is not met by EP '807. Particularly, as shown in all of the Figures of EP '807, the voltage source is a battery which supplies DC current and not an AC voltage. Namely, the art recognized symbol for a battery is indicated as power source 7 in Fig. 1 of EP '807, and the art recognized symbol for a variable DC voltage source is indicated as power source 9 in Fig. 8. EP '807 is silent with respect to AC voltage application means as required by claims 1 and 2, and shown as, for example, AC power supply 19 in Fig. 1.

The significance of applying an AC voltage between the first and second electrodes as opposed to a DC voltage when measuring the concentration of the catalyst poison gas, such as CO, is discussed in paragraphs [0017]-[0019] of Applicants' published U.S. application. Namely, in a conventional gas sensor (such as that disclosed by EP '807) employing a solid polymer electrolyte and obtaining CO concentration from only DC current, since DC current is caused to flow, H<sub>2</sub>O is always pumped together with H<sub>2</sub> such that the H<sub>2</sub>O concentration in the vicinity of the catalyst of the anode electrode becomes very low. CO having adsorbed onto the catalyst reacts with H<sub>2</sub>O so that desorption and adsorption reach an equilibrium state. Therefore,

when H<sub>2</sub>O decreases, desorption of CO does not occur immediately even when CO contained in an analyte gas is depleted. In contrast, when the measurement is performed by use of alternating current as in the present invention, voltages of alternating polarities are periodically applied to the electrode. In this case, because H<sub>2</sub>O is always present in the vicinity of the catalyst, the desorption and adsorption of a catalyst poison gas are always in an equilibrium state. Thus, desorption of, for example, CO occurs through reaction with H<sub>2</sub>O such that responsiveness is not deteriorated.

Because EP '807 fails to meet one or more terms of amended claim 1, it is respectfully submitted that EP '807 does not anticipate claims 1 and 2 and withdrawal of the foregoing rejection under 37 U.S.C. §102(b) is respectfully requested.

Claims 3-23 and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over EP '807 in view of U.S. Patent No. 4,419,190 to Dietz et al. Dietz et al. was cited as teaching application of AC and DC currents to a gas sensor. The reason for rejection was that it would have been obvious to apply a DC and AC voltage to the sensor of EP '807 as taught by Dietz et al. so as to enable temperature sensitive readings.

Applicants respond as follows.

First, the Examiner incorrectly asserts that EP '807 teaches all of the limitations of claim 2, but fails to teach the addition of a DC current. To the contrary, EP '807 clearly discloses application of a DC voltage across the first and second electrodes, and does not mention application of an AC voltage as required by present claim 2.

Dietz et al. relates to a method and apparatus for measuring the operating temperature of a solid electrolyte-gas sensor where an AC signal is superimposed from an AC voltage source onto the applied voltage from a DC voltage source. That is, Dietz et al. relates to measuring

sensor impedance which in turn correlates to the sensor temperature. On the other hand, the DC component is representative of the oxygen concentration of the sensor (see claim 1 and column 5, lines 22-27 of Dietz et al.). Thus, application of an AC voltage in Dietz et al. has nothing to do with measuring the concentration of a gas component which is a characteristic feature of the invention.

Another difference is that the sensor in Dietz et al. is a solid electrolyte-type gas sensor made of an ion conductive solid electrolyte body such as zirconium dioxide (column 3, lines 11-20) entirely different from the proton conductive layer of EP '807 (typically a polymer as described in paragraph [0018] in EP '807) and that of the present invention.

Accordingly, there is no apparent reason which would lead one of ordinary skill to apply an AC voltage of Dietz et al. used to measure the temperature of a solid electrolyte sensor to the hydrogen gas sensor of EP '807 utilizing a proton conductive (polymeric) layer. Another reason is that there is nothing in the cited prior art which meets the function of obtaining a concentration of a catalyst poison gas on the basis of an impedance measurement as required by present claims 1 and 2.

Regarding this last point, a means-plus-function clause defines corresponding structure described in the specification and drawings for performing the claimed function and equivalents thereof. MPEP § 2181. Moreover, application of a prior art reference to a means-plus-function clause requires that the prior art element perform the identical function specified in the claim. MPEP § 2182. That is, with respect to means-plus-function limitations, even if "the patent structure is capable of being manipulated to carryout the claimed function," this cannot be a basis for rejecting the claims.

In this regard, the claims have been amended to specify AC voltage application means and DC voltage application means for performing specific functions.

Although Dietz et al. applies an AC voltage so as to measure an impedance between the first and second electrodes, Dietz et al. does not perform the function of obtaining a concentration of a catalyst poison gas contained in the analyte gas on the basis of the impedance measurement as required by claims 1 and 2.

Claim 3 has been similarly amended to require DC voltage application means for applying DC voltage between the first and second electrodes *such that the first electrode is higher in electric volt potential than the second electrode*. None of the cited prior art performs the function of applying a DC voltage between the first and second electrodes such that the first electrode is higher in electrical potential than the second electrode.

Claims 5 and 6 have been similarly amended to employ means-plus-function language where the cited prior art does not perform the function specified in the claim.

In summary, the amendments to claim 1, 2, 3, 5 and 6 introduce additional structure into the amended claims not met by the cited prior art and which fails to perform the identical functions specified in the respective claims.

Claim 24 was rejected under 35 U.S.C. §103(a) as being unpatentable over EP '807 in view of U.S. Patent 6,602,630 to Gopal. Gopal was cited as teaching an electrode assembly having a certain catalyst loading or areal density.

Applicants rely on the response above with respect to the rejection of claims 1 and 2 over EP '807 alone.

For the above reasons, it is respectfully submitted that the amended claims are patentable over the cited prior art, and withdrawal of foregoing rejection under 35 U.S.C. §103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-25 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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